



State of Utah

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TO: Internal File

FROM: Priscilla Burton, Sr. Reclamation Specialist & Soils/Team Lead

RE: Response to Deficiencies. Reclamation Plan, Part 4, PacifiCorp, Cottonwood/Wilburg Mine, C/015/019-AM00B-4

SUMMARY:

A chronology of this amendment extends over a two year period as follows:

Action	Date Rec'd	Date Issued
Amendment AM00B revising Part 4 of the Reclamation Plan	Jan 19, 2000	
Technical Analysis AM00B		April 18, 2000
60 day extension	June 5, 2000	Granted until August 4, 2000
Side-by-side review of PFO copy, SLC copy and Permittee's copy of the MRP	Aug. 3, 2000	
Partial Response	August 9, 2000	
Technical Analysis AM00B-2		Nov. 14, 2000
60 day extension request	Jan. 26, 2001	(granted until April 24, 2001)
60 day extension request	April 24, 2001	(granted until July 2001)
Response: adjusted bond calculations for Stage I and Stage II reclamation work and missing information (plates associated with App. III)	July 2, 2001	
Technical Analysis AM00B-3		Sept. 19, 2001
30 day extension request	Nov. 1, 2001	
Response	Nov 21, 2001	
Technical Analysis AM00B-4		Dec. 21, 2001

TECHNICAL MEMO

Soil sampling to characterize the fill slopes for potential use as substitute topsoil was conducted in 1980, 1983, 1989 and 2001. Results indicate that some of this soil must be disqualified for use as substitute topsoil due to salt loading from winter road salting and snow removal operations.

TECHNICAL ANALYSIS:

ENVIRONMENTAL RESOURCE INFORMATION

SOILS RESOURCE INFORMATION

Regulatory Reference: R645 -301-411, -301-220.

Analysis:

The reclamation plan describes using the top 18 inches of soil from five major interim fill slopes which were seeded in 1988 (see Part 4, pages 18 - 21). These slopes are shown in green on Drawing KS1217D, 1993, Vegetation Monitoring Map, dated 4/18/94 (found in the Annual Report Volume); on Plate 2-18 Mine Plan Area Soils Map (CM-10346-WB); on Drawing WS 449 D, Cottonwood Mine Surface Facilities Map 2000 Vegetation Monitoring (found in the Annual Report Volume); and on a 1989 Figure drawn in Appendix D, Soil Physical and Chemical Analysis. The fill slopes identified in Appendix D are: Area W1 (upper parking lot); Area W2 west (slope west of the Wilberg conveyor); Area W2 east (slope east of the Wilberg conveyor); Area W2 north (slope below parking lot and adjacent to the road); and Area W3 (sediment pond fill). The location and acreage of each fill area is currently shown on Plate 4-3 (map CM10484-WB), dated November 13, 2001.

On Plate 4-3 (map CM10484-WB) dated November 13, 2001, the total acreage of interim vegetated slopes that will supply substitute topsoil is $1.34 + 0.15 + 1.87 + 0.27 + .47 = 4.1$ acres. Salvage of eighteen inches from these slopes will provide approximately 10,000 cubic yards of substitute topsoil. On page 21 of Part 4 it was previously noted that 70,000 cubic yards of substitute topsoil would be recovered from the fill slopes. This estimate has been reduced to 10,000 cubic yards. This estimate may be further reduced due to salt loading of the soils, as discussed below.

Spoil banks were tested in 1980, 1983 and 2001. The soil in the fill slopes was sampled in 1983, 1989 and in 2001. Sampling results and location maps are included in Appendix D. The Mine Plan Area Soils Map (CM-10346-WB) is also necessary for interpretation of the results. Samples were not composited in the year 2001. However, in 1989, the laboratory analyzed sub-samples composited by depth segment from several sample locations within each fill area. Sampling locations were similar between studies, although not all five fill slopes are represented at each sampling date.

TECHNICAL MEMO

In the year 2001, at the Cottonwood/Wilberg Mine facilities area, sample SS1 was taken of the spoil banks by the former security guard station. Samples SS2 and SS8 were taken from the main access road and the Wilberg fan portal access road, respectively. Sample SS9 was taken outside the disturbed area boundary from the slope directly north of the substation/storage yard. Samples SS3, SS4, SS5, SS6, SS7 represent the fill slopes. The following chart listing sample site locations and designation for each sample year was created to enable comparison of the spoil banks and fill slopes over time.

Sample Location and Designation By Year Sampled

	1980	1983	1989	2001
Spoil banks – by former security guard station	samples 658, 659, 660, 661, 662.	Sample W4 (a composite of 10 samples)	not sampled	sample site SS1
Area W1 – upper parking lot	not sampled	sample W1 (a composite of 10 samples)	samples 1213, 1214, 1215 (each a composite of 5 samples)	sample sites SS6 and SS7
Area W2 north – slope below parking lot and adjacent to the road	not sampled	sample W2 (a composite of 10 samples)	samples 1222, 1223, 1224 (each a composite of 2 samples)	not sampled
Area W2 east – fill slope east of the Wilberg conveyor	not sampled	not sampled	samples 1219, 1220, 1221 (each a composite of 5 samples)	sample site SS4
Area W2 west – fill slope west of the Wilberg conveyor	not sampled	not sampled	samples 1216, 1217, 1218 (each a composite of 5 samples)	sample sites SS5
Area W3 – sediment pond fill slope	not sampled	sample W3 (a composite of 10 samples)	not sampled	not sampled

Glancing through these soil sample results one immediately notes that sample site SS4 has elevated Electrical Conductivity (values of 3.16 mmhos/cm in the 0 - 6 inch depth sample increasing to 9.5 mmhos/cm in the 12 - 18 inch depth sample) and Sodium Adsorption Ratio values. The SAR value in the 0 - 6 inch sample is 16.4 and ratio increases with depth to 24.6. As previously noted by A. R. Southard and T. H. Furst in the June 15, 1989 report entitled "Soils of the Wilberg Mine Site: Report on Soil Physical and Chemical Analyses" (found in Appendix D), extreme SAR values are probably due to snow removal and salting operations along the road during the winter months.

TECHNICAL MEMO

Prior to including Area W2E in substitute topsoil calculations, further sampling of the Area W2 East will be required to show that the sample SS4 is not representative of the entire slope.

Other fill slopes also have SAR values that are higher than native soils, but not to this extreme. For example SS5 has a SAR value of 5.24 in the upper six inches and the value decreases through the profile.

A very different soil was found on the undisturbed slope 200 yards away from SS5. This soil was a silt loam. Differences were found in EC, AWC, rock content, saturation percent and TOC.

Wilberg Mine Test Plots

In 1989 test plots were established in Area W2 West (see Map 2-18) at the Wilberg Mine site to test mulch (hydromulch vs. mulch blanket vs. hay & netting) and irrigation applications (once a week for two years) for final reclamation (see page 20 and 21 of the submittal for details). All test plots received the final reclamation mix (page 24 of the submittal). A design of the test plots is located in Part 4, Figure 4. Page 20 of the submittal states that test plots have been monitored according to the plan for final reclamation monitoring and refers the reader to Part 2: Vegetation Information for sampling technique. The sampling results are found in the volumes of Annual Vegetation Monitoring Reports. The most recent sampling was conducted in 1999. During the 1999 evaluation, a salt-effect on vegetation growth was noted on plots immediately adjacent to the road.

Waste Rock Storage Site (UTU-65027)

In the year 2001, samples were collected from waste rock at the Waste Rock Storage Site (UTU-65027). As stated on page 9 of Part 4, the analytical results have been placed in Appendix D of Part 4.

Findings:

The Division concludes that the soil in the area of SS4 (Area W2 East), and the soil north of the test plots (designated as W2 north in the 1989 study) is not useful as topsoil material, unless further testing demonstrates that the salt loading of the soil has diminished or was not representative of the entire slope. The information provided is adequate to meet the minimum soils resource information requirements of the Regulations.

RECOMMENDATION:

The reformatting changes of this submittal (i.e. the new Table of Contents with list of Appendices) is accurate and can be approved. The issues raised by the side-by-side meeting of August 3, 2000 have been resolved. This submittal includes the results of the 2001 soil sampling in Appendix D. Soil in the area of SS4 is not useful as topsoil material due to the extreme SAR values (probably due to snow removal and salting operations along the road during the winter months). Earlier sampling also disqualified the soil on the slope across the road from and north of the test plots (designated as W2 north in the 1989 study) for the same reason. Interim revegetated outcrops that will be the source of substitute topsoil are identified on Plate 4-3 (Map CM-10484-WB). The estimated acreage of 4.1 acres will be reduced as will the estimated volume of salvageable soils (10,000 cubic yards), unless further testing demonstrates that salt loading is restricted to a small area of the slope or that salt loading has diminished over time.

Now that the reorganization and reformatting has been completed, it would be in the Division's best interest to review the plan for details of reclamation technique which may have changed since the plan was devised in the 1980's.